



## KEY POINT SUMMARY

### OBJECTIVES

The objective of this review was to describe the main features of the NICU design and determine the advantages and limitations of the design on the outcomes for patients, families, and staff.

## Impact of the design of Neonatal Intensive Care Units on neonates, staff, and families: A systematic literature review

Shahheidari, M., & Homer, C. 2012 | *Journal of Perinatal and Neonatal Nursing*. Volume 26, Issue 3, Pages 260-276

### Key Concepts/Context

The authors indicate that the design of NICUs incorporating single family rooms as evidence indicates this room type contributes to the better development of babies, facilitates increased parental involvement in care, controls infection, and reduces noise and length of stay. The authors undertook a systematic literature review to determine how the pros and cons of NICU design affect patient, family, and staff outcomes. The review indicated that single family rooms (SFRs) were better in terms of patient care and parental satisfaction, while open bay units were perceived by the staff as conducive to monitoring of multiple babies and communication among staff.

### Methods

A systematic review was undertaken of English-language, peer-reviewed articles between 2000 and 2011. These articles were searched on four online health databases. Articles that did not examine or report on the design features of the NICU and its impact on outcomes were not included in the review.

### Findings

From an initial number of 1080 articles retrieved, the authors ultimately reviewed a total of 12 articles after eliminating duplicates, non-NICU-related and those that did not study the impact of NICU design on patient, family, and staff outcomes.

The authors categorized their findings into two broad categories – impact of the NICU environment on 1. Patients and 2. Staff.



### DESIGN IMPLICATIONS

This study indicates that SFRs are beneficial to neonates vis-à-vis their medical progress, infection control, lengths of stay, and re-hospitalization. There is scope for increased privacy and infant-parent interaction in SFRs. On the other hand, open-bay units enable staff to visually monitor patients from nurse station, walk shorter distances, and have more communication opportunities with peers for education and support.

NICU environment and impact on patients:

Medical progress and infection control: When infants/neonates were in SFRs versus open bay units:

- There was a 57% reduction in apnea.
- There was a reduction in the use of mechanical ventilation and positive air pressure.
- There was lower risk of moderate to severe bronchopulmonary dysplasia.
- Infections decreased.
  - Increase of hand-washing in the SFRs
  - Sinks and/or hand sanitizer dispensers located in SFRs

Length of stay and re-hospitalization: As compared to open bay units, the length of stay for infants in SFRs and re-hospitalization of infants who were in SFRs was much lower.

Noise: Noise in NICUs had a negative impact on the patients. This impact was seen in increased heart and respiration rates, sleep disturbance, hearing impairment, decrease in oxygen saturation, and adverse impact on the development of nervous system.

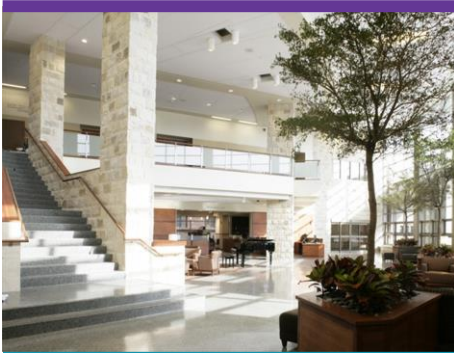
- Noise levels in open bay units were higher than in SFRs.
- The sources of noise in open bay NICUS were: staff and/ or visitor activity, and nearness to the entry and the nurses' desk and during visiting hours and shift change.
- Noise levels in the SFRs were lower because of the presence of fewer people and fewer machines.
- Reduction of noise in the NICUs can be achieved through the installation of soft vinyl floors and sound-absorbent materials in the ceiling.

NICU environment and impact on staff:

Layout:

- Walking distances were shorter in open bay units.
- Nurses reported being able to visually monitor their patients from the nurses' station.
- In SFRs, nurses were troubled about not being aware of the progress of all patients.

Communications:



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- In an SFR layout, nurses expressed feelings of separation, reduced opportunities for talking, support and continued education, and decreased communication and staff interaction.

#### Privacy and comfort:

- Families had more privacy in the single units as compared to the open bay.
- They felt more like a family in the SFRs and like visitors in the open bay units.
- Privacy feelings were affected by the larger physical space and increased parental visitation.
- SFRs promoted infant-parent interaction.

#### Limitations

Authors allude to the lack of research on actual NICU design as limiting to their review. They also indicate that the findings of most of the studies were generalizable to the United States and other developed countries.

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